Heat Rate/Energy Efficiency

In new condition, the combined cycle plant is designed to achieve a heat rate of 6,550 Btu/kWh without duct burning based on higher heating value, gross output, and ISO conditions. With duct burning the design heat rate is 6,940 MMBtu/hr. With 1,400 hr/yr of duct burning and the remaining annual hours without duct burning, the weighted average heat is 6,612 Btu/kWh

Stonewall is proposing to verify performance initially within 180 days of startup and once every Title V permit term (≈5 years) based on American Society of Mechanical Engineers Performance Test Code on Overall Plant Performance, ASME PTC 46-1996 or other method approved by DEQ. In order to establish a permit limit for these performance tests it is necessary to include margins to account for long term equipment performance.

To determine the heat rate limit for the permit, the following compliance margins were added to the base heat rate of 6,550 Btu (HHV)/gross kWh without duct burning and 6,940 MMBtu/hr with duct burning;

1. A 3.4% performance margin reflecting the efficiency losses due to permanent and recoverable combustion turbine degradation.
2. A 1.2% degradation margin reflecting operational variation and auxiliary power degradation. The operational variation assumes differences in operating techniques including but not limited to CT operation, degradation in catalyst life, HRSG tube leaks, excessive wear on equipment and design issues causing temporary derates, etc. Auxiliary power degradation includes efficiency losses over time of auxiliary (balance of plant) equipment including but not limited to pumps, motors, fans, etc.
3. A 7.1% degradation margin reflecting the efficiency losses over time of the steam turbine system including but not limited to CT gas performance (i.e., less mass flow), the HRSG, the cooling tower, etc.

Based on the above margins, Stonewall is proposing a 7,340 Btu (HHV)/gross kWh heat rate limit at full load, without duct burning, and a 7,780 Btu (HHV)/gross kWh heat rate limit at full load, with duct burning, adjusted to ISO conditions, which will be demonstrated once per Title V permit term. Stonewall is proposing to verify performance initially within 180 days of startup and once every Title V permit term (≈5 years) based on American Society of Mechanical Engineers Performance Test Code on Overall Plant Performance, ASME PTC 46-1996 or other method approved by DEQ. All testing will be conducted at full load and results will be corrected to ISO conditions.

GHG Emission Limits

Stonewall proposes to continuously monitor CO_2 emissions using 40 CFR Part 75 procedures. Emissions of CH_4 and N_2O as CO_2e will be based on emission factors and global warming potentials in EPA's Mandatory GHG reporting rule and fuel use. The resulting emission rate is 118.28 lb CO_2e/MMBtu. The proposed GHG emission limit will be a lbCO_2e/gross MWh limit as a 12-month rolling average updated monthly. Because the 12-month rolling average will include startups, shutdowns, and low load operations, in order to establish a permit limit for continuous performance a 3% operational margin was added to the heat rate margins cited above. This operational margin accounts for dispatch variability and start-up and shut-down events. As noted in the PSD permit application, the facility may be operated as an intermediate load power plant with frequent startups and shutdowns. During startup and shutdown events, the combustion turbine power production efficiency is low and the steam turbine is not in operation until late in the event resulting in a much higher heat rate. The proposed annual average GHG emission rate is 903 lb CO_2e/MWh (118.28 lb/MMBtu x 6,612 Btu/kWh x 1.034 x 1.012 x 1.071 x 1.03 x 1,000 kWh/MW x 1 MMBtu/1,000,000 Btu).